

# Citrix

## 1Y0-A16

**Architecting a Citrix Virtualization Solution**

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## Healthy Helping Hands

### Executive Summary

Healthy Helping Hands is a multi-national health care equipment company with operations in 10 countries. The organization manufactures and distributes a variety of health care products ranging from its unique baby breathing devices to diabetes supplies to wheelchairs.

Based on current projections, Health Helping Hands expects to expand the company primarily through small, targeted acquisitions as well as a modest amount of organic growth. The organization has been affected by numerous technical challenges, specifically with delivering applications to its users - 4 000 employees approximately 500 of which are contractors. In addition, because the timing and size of acquisitions is unpredictable, the IT staff must have the ability to adjust the technical integration of newly acquired companies to accommodate unpredictable timing. For example, while a period of several weeks or months may have been planned, the integration may need to be completed in several days. These challenges caused the company to investigate the Citrix Delivery Center offerings leading to the CIO's decision to move forward with those Citrix Delivery Center products and features that address IT and user needs.

With users spread throughout numerous offices, some with and some without IT staff, it is imperative that supportability, administration and security are factored into the new solution. However, for the 4 000 employees and contractors within the organization the CIO has mandated that users should be provided with a highly available virtualization solution that best suits their job function.

### 1.1 Current Citrix Environment

Healthy Helping Hands currently runs a Citrix Presentation Server 4.0 farm based on Windows Server 2000 that services the Human Resources (HR) applications. Because this product has reached 'end-of-life' and is no longer supported and this farm has had numerous growth issues, the CIO has designated that the new design will incorporate XenApp, XenDesktop, and/or XenServer as appropriate to address present and future application and access requirements.

However, before moving into the design phase, the current Presentation Server environment, as well as infrastructure, user requirements, applications and related areas have been assessed to determine current status, issues and considerations for the new design.

The Consulting project team worked on-site at Healthy Helping Hands during the week of February 1-5, 2010, conducting this Infrastructure Assessment as defined in the Statement of Work, dated January 20, 2010. This document represents the deliverable for the infrastructure Assessment phase of the project.

### 1.2 Key Project Findings

During the week of February 1, 2010- an assessment of Healthy Helping Hands' Application Delivery environment was conducted, and the project team determined several key findings:

- The current environment is built on 32-bit architecture, although some hardware may support 64-bit architecture.
- The CIO wants to migrate all IT platforms to 64-bit during upgrade/replacement programs only.

### 1.3 Next Steps

After thoroughly reviewing this document, Healthy Helping Hands should take the following actions within the short term (one-to-two weeks) and long term (several weeks or longer):

**Long-Term Activities:**

- Migrate all IT platforms to 64-bit for compatibility and support.

### 1.4 Issue Status and Resolution

The following issues were also addressed during the course of this assessment:

Issue	Description	Status	Assignment/Resolution
Printing	Print jobs intermittently fail	Closed	Printer bandwidth had been set to 10Kbps on some servers, thus users perceived that print jobs were failing when they were actually just very slow. Printer bandwidth limit was removed where it existed.
Logon time slow	Users report that logon can sometimes take two minutes or more	Closed	Terminal Server roaming profiles were only configured for some users and these were housed on an antiquated file server running on Windows Server 2000; however the antiquated file server is no longer being used and local profiles were implemented. Policies and profiles should be revisited during the upcoming design effort. The following steps were taken to perform a pilot test of EdgeSight and collect information on the slow logon times: <ul style="list-style-type: none"> <li>• Installed EdgeSight server with the appropriate software versions for all prerequisites documented in the EdgeSight Installation Guide.</li> <li>• Installed the EdgeSight Web Server, SQL Server 2005 SP2 Database with Reporting Services and EdgeSight console on a single server for the pilot.</li> <li>• Installed the EdgeSight agent on all eight of the servers in the Presentation Server 4.0 farm.</li> <li>• Configured EdgeSight to use the default worker and agent settings.</li> <li>• Verified that all eight of the agents reported to the EdgeSight console within the first 24 hours after installation.</li> </ul>
Users cannot log on	During logins, users intermittently receive "no license" errors	In progress	Terminal Server and Citrix licensing has not been monitored since the current farm was installed and the user base has increased. License information is required to assess usage patterns and license denial.

## Users

Currently, only the Human Resources group accesses applications hosted on Citrix Presentation Server 4.0. HR users typically log on to the HR applications suite as needed, approximately two or three times throughout the day and then log off when finished due to security requirements. When a new Human Resources employee joins the company, he/she is added to this group and thus gains access to the HR applications suite.

In general, this group reports overall satisfaction with application access through Presentation Server. However, some users have reported printing issues as described in Section 1.4.

With the exception of the San Francisco and New York locations where the majority of the IT staff is located, users are generally frustrated with the IT staff because of hardware and application access



issues associated with traditional application delivery In formal and informal settings the CIO has presented the concept of vitalizing applications and desktops, and users have responded favorably Thus, the CIO has decided that Healthy Helping Hands will virtualize all applications and desktops, making the delineation based on job requirements.

## Client Devices

All of the HR users currently accessing the Presentation Server-based applications do so by means of Windows XP or Windows Vista laptop or desktop computers.

With the exception of Customer Service, most office users have computers that run Windows XP or Vista. The manufacturing employees have access to locked-down antiquated computers on the Manufacturing floor and common areas. For several years, the Manufacturing Department has reported numerous problems related to frequent equipment failures. This has normally been blamed on the environmental conditions, such as dust dirt and vibration, found on the manufacturing floor. The Customer Service employees also have antiquated computers Both the manufacturing and customer service devices will be replaced with new thin client devices as part of this initiative.

Some employees have purchased their own handheld devices, such as iPhone, HP iPAQ with Windows Mobile and Blackberry. As part of an earlier initiative, Microsoft ActiveSync is installed on the Citrix servers to facilitate Windows-based PDA sync for a small group of users. This feature is still available but should be disabled for security reasons. These devices are not officially supported by the IT department at Healthy Helping Hands, only "best effort" support is provided.

Current breakdown of computer devices at Healthy Helping Hands:

Device Type	# of Devices	Operating System	Browser	Citrix Plug-Ins				
				Presentation Server	Streaming	Single Sign-On (Password Manager)	Access Gateway	Other
Windows 2000	250	Windows 2000	IE 6	N/A	N/A	N/A	N/A	N/A
Windows XP	1000	Windows XP	IE 6/7	Web Versions 10.x-11.x	None	None	None	None
Windows Vista	1000	Windows Vista	IE 7/8	Web Versions 10.x-11.x	None	None	None	None
Macintosh	10	Mac OS X (Intel)	Safari 4	N/A	N/A	N/A	N/A	None

## Applications

The HR applications suite, named PositivelyPeople, is based on a front-end application that provides access to various modules, including payroll time sheets, vacation requests, new hires and former employees. The sensitive data in the PositivelyPeople application must be treated with strict confidentiality and must only be accessible to members of the HR user group; distribution of the data must be prevented. The output of the modules can be in either Microsoft Word or Excel file formats, So these applications are co-located with PositivelyPeople on the same Presentation Servers and icewise presented as published applications. Thus, users are presented with three applications, PositivelyPeople, Word and Excel, and within these applications each user creates his/her own customized view.

Installation of PositivelyPeople is performed manually based on a thoroughly documented process and Installation Manager is used to deploy Word and Excel. Because only these three applications are published there is no process for testing and integrating new applications. All applications are published with consistent settings

In addition, all users require access to office productivity applications including e-mail.

Several months ago Healthy Helping Hands explored hosting the CAD application on XenApp 5.0 Platinum for Windows Server 2003 (x86), but only a maximum of five concurrent user sessions could successful be hosted on each server due to heavy resource requirements even with CPU and memory optimization enabled.

The vendor for PositivelyPeople has tested and certified the application to run on Windows Server 2008. The vendor has also found that leveraging High Availably for XenApp applications would be beneficial

Breakdown of all user groups and their application requirements:

User Group	Responsibilities	Application Requirements and Comments	Location	User Count
Engineers	Design the latest products and enhancements	Primary requirement is access to high-resource CAD application.	Based out of corporate and regional offices	100
Manufacturing	Read the latest product designs and integrate into production floor setup	Most users are based on the factory floor and are not computer savvy; they require access to a time clock and one ERP application to log completed projects. Managers require access to the full ERP suite.	Based out of Mexico City and Hong Kong locations	3000
Finance	Tabulate sales and financial information	Users require access to a suite of sensitive financial data applications, including payroll. Individual print jobs may sometimes be very large.	Based out of corporate and regional offices	200
Human Resources	Assist with new employees and termination guidelines, as well as benefits	Users require access to a suite of sensitive HR applications. Printing security is a high concern.	Based out of corporate and regional offices	100
IT	Build and maintain the infrastructure used to support business activities	Most users require access to all applications for administration purposes.	Based out of physical data center locations only	150
Marketing	Develop advertisements and marketing campaigns utilizing various forms of media	Primary requirement is access to high-resource marketing design application and CRM database. This group sometimes has complex printing requirements.	Based out of corporate offices	200
Sales	Generate revenue based on face-to-face customer contact	Users require access to ERP and CRM applications; they are moderately computer savvy.	Corporate, regional, branch and virtual offices with frequent travel to customer locations	150
Customer Service	Take orders and provides product support for customers	Users require access to ERP and CRM applications; each minute of downtime costs \$1,000 USD.	Based out of corporate offices	50

## Application Access

Users access applications by means of the Web Interface. The internal Web Interface site,



<http://applications.healthyhelpinghands.com> is accessible to all employees but only presents applications to the Human Resources group at this time. If the Web Interface will be used in the future environment, this URL should be used because this employee group is already familiar with it.

Most of the HR users access their application suite internally; however the IT staff recently created a Secure Gateway/Web Interface server in the DMZ so that users could access their applications while traveling. However, this server is based on older hardware and has had intermittent issues over the past few weeks. Thus, most HR users can no longer rely on having remote access to their applications.

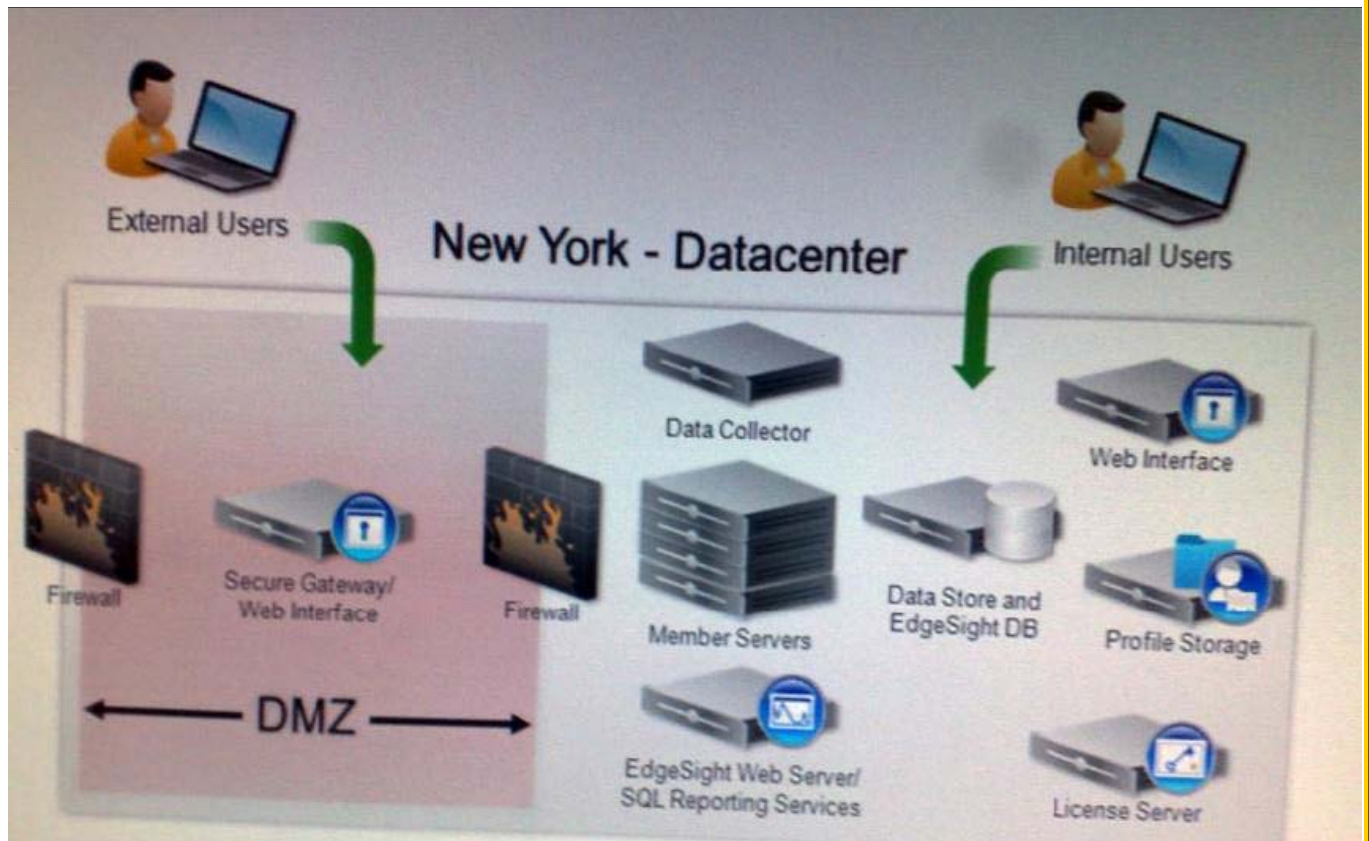
In the new environment, all employees should have remote access to their applications and/or desktops, with the exception of manufacturing floor employees and contractors.

## **XenApp Farm**

The XenApp farm is based on the following:

- One dedicated data collector
- One internal Web Interface server
- One Citrix/Microsoft Terminal Services license server
- One SQL Server 2005 server hosting the Data Store and EdgeSight databases
- One web server hosting EdgeSight web server and SQL Reporting Services
- One antiquated file server hosting old user profiles
- One Secure Gateway Web Interface server located in the DMZ
- Eight Presentation Server 4.0 servers





Hotfix Rollup Pack 2 (PSE400W2K3R02) is the only hotfix retailed on each of the Presentation Server 4.0 servers.

A Citrix policy is configured for all Human Resources group users and has these characteristics:

Policy Name	Connection Type & Filter	Policy Setting\ Group	Configuration
HR Users	All servers	<b>Client Devices\Resources\Audio</b>	
		Turn Off Speakers	Enabled
		<b>Client Devices\Resources\Drives</b>	
		Mapping	Enabled: Turn off Floppy disk drives, hard drives, CD-ROM drives, and remote drives.
		<b>Printing\Client Printers</b>	
		Auto-Creation	Enabled: Auto-create the client's default printer only
		Printer Properties Retention	Enabled: Saved on client device only

## Virtualized Desktops

At the current time, virtualized desktops are not used. Published desktops are only made available to administrators, and all users in the HR group access their three applications by means of published applications. Because all applications will be virtualized in the future Healthy Helping Hands will consider published desktops or virtualized desktops for users based on what is deemed most appropriate. The CIO has determined that where virtualized desktops will be used High Availability is required.

## Databases

A single SQL Server 2005 server currently houses only the Presentation Server 4.0 data store and EdgeSight database. This server is maintained by the Healthy Helping Hands database administrator, and a full backup is performed each night as part of the regular maintenance program.

Citrix Database	Database Type and Version	Server	Shared or Dedicated	Database Backup Type/Frequency	Redundancy/High Availability
Data Store	SQL Server 2005	HHHS QL01	Shared with ES database	Full/nightly	None
Resource Manager Summary Database	Not used				
Configuration Logging	Not used				
EdgeSight	SQL Server 2005	HHHS QL01	Shared with Data Store database	Full/nightly	None
Password Manager Central Store	Not used				
SmartAuditor	Not used				

The backend database for the PositivelyPeople application is housed at the main data center. It is based on a clustered configuration of SQL Server 2005.

Healthy Helping Hands is moving all databases to SQL Server 2008 based on robust new hardware and virtualized servers. They would like to transition the Citrix and PositivelyPeople databases to this new platform as soon as reasonably possible.

## Windows Server and Active Directory

The Presentation Servers are based on Windows 2000 Server Healthy Helping Hands understands that

Microsoft has ended support for this platform and plans to move to Windows Server 2003.

The Terminal Services License Server is hosted on a single domain controller wrth 100 Client Access Licenses (CALs). Because Windows XP devices include embedded Windows 2000 Server Terminal Services licenses, only about half of the Terminal Services CALs have been consumed.

The IT staff of Healthy Helping Hands has built all of the servers in the Presentation Server farm manually. These servers have been in service for several years with no significant changes, so the process of building or rebuilding a server has not been a regular part of maintenance tasks. However, an automated, easy-to-use server build process must be incorporated as part of the new farm design.

The Citrix-related servers are housed within Active Directory as follows:

- Domain: healthyhelpinghands.com
- Organizational Unit (OU). Citnx Servers
- OU: Presentation Servers (contains the Data Collector and member servers in the production farm)
- OU Other (contains all other servers)

No logon scripts are enabled for users: Healthy Helping Hands abandoned logon scripts last year in favor of Group Policy Objects.

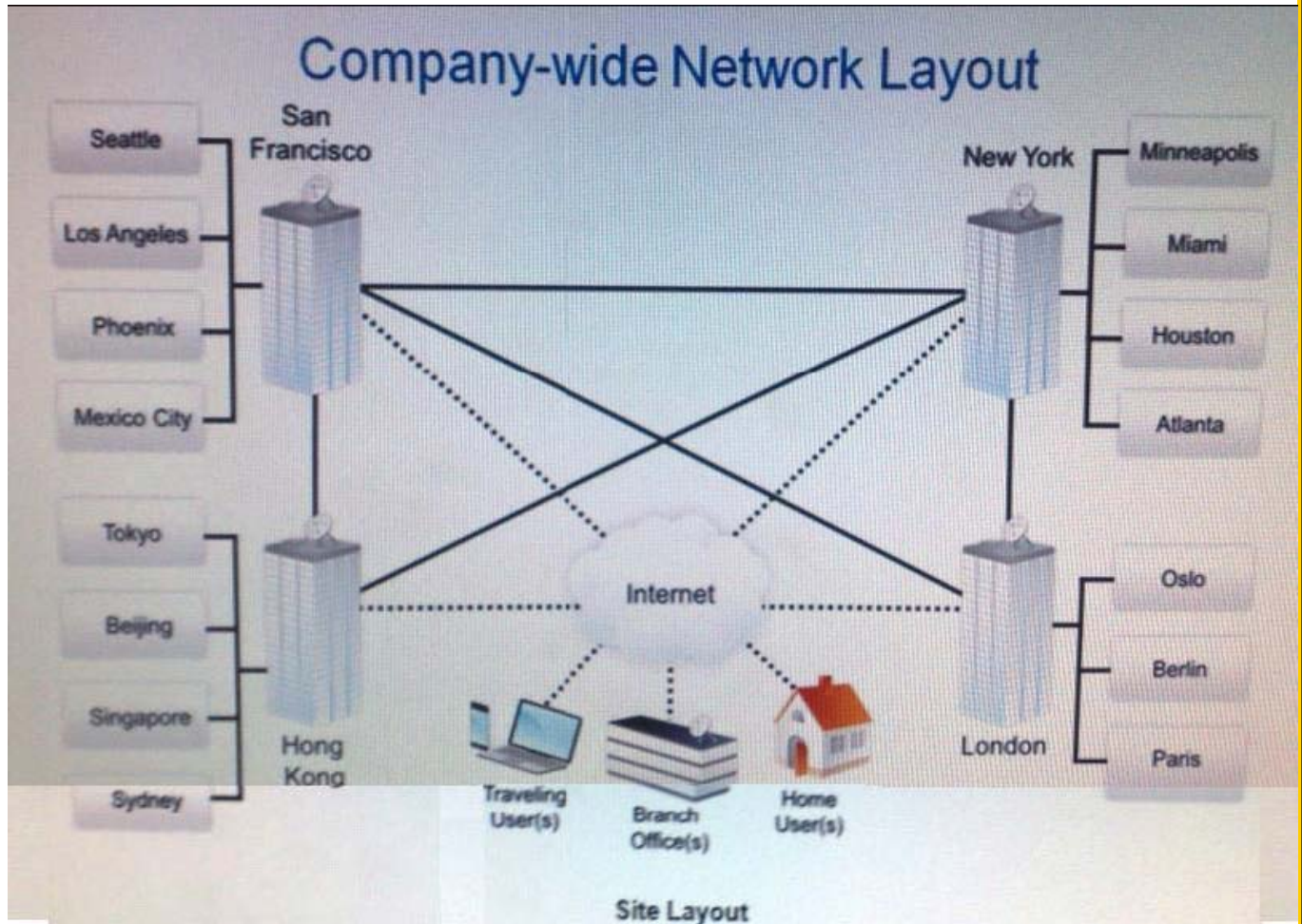
Healthy Helping Hands applies a minimal set of Group Policy Objects (GPOs) to the Presentation Servers. Only one GPO is applied directly to the Citrix Servers OU, which configures Internet Explorer settings. Other policies are applied at a higher level and include settings for Windows Updates.

Roaming profiles were implemented previously, but issues were experienced with one of the PositivelyPeople modules. Instead, local profiles are being used and administrators must manually delete the profiles when necessary. No Terminal Services-specific home drives have been implemented as they have been deemed unnecessary.

## **Network Architecture**

The site layout of Healthy Helping Hands:





Healthy Helping Hands is a worldwide organization comprised of four data centers in New York, San Francisco, London and Hong Kong and numerous regional offices each connected by a private wide area network to a data center. Additionally, hundreds of users work from small regional offices. Appropriately 20% of all users work from home offices or travel part-time.

This is likely to increase significantly due to a new flexible working policy for corporate users. Because of this, reliability of remote access will become more important. The CIO has emphasized that internal WAN traffic must be kept to a minimum. As such, each user has a "home" data center, to which he/she primarily connects; if there is a failure, virtualized applications should fail over to the designated backup data center.

Based on this architecture the data centers are designed to support specific functions;



Data Center	Data Center Connections	Functionality
New York	3 (San Francisco, London, Hong Kong)	Americas East and primary data center
San Francisco	3 (New York, Hong Kong, London)	Americas West data center and backup/disaster recovery site
London	2 (New York, San Francisco)	European data center
Hong Kong	2 (New York, San Francisco)	Asia Pacific data center

## Enterprise Storage

User data is stored on the HP SAN. Healthy Helping Hands plans to have a Hewlett-Packard StorageWorks solution with a capacity of more than 1000TB space physically located at each of the four main data centers. Initially, only about 200TB of space will be used, and there is an internal effort underway to delete files that are no longer required.

Healthy Helping Hands plans to upgrade the storage solution in order to incorporate redundancy, High Availability and replication between the primary and backup data centers.

## Server Hardware

Characteristics of all physical servers associated with the Presentation Server 4.0 environment;

Facet	Citrix Servers
Number of Processors	2
Processor Type	Intel Xeon 64-bit compatible
Processor Speed	1.5.0Ghz
Memory (GB)	4GB
Disk Capacity	5x36GB
Disk Speed	SCSI
RAID	RAID5 with Hot Spare
Maximum NIC Speed	1000Mb/Full (set to Auto)
Management Software	IBM Director

Going forward, Healthy Helping Hands is planning to purchase new hardware to support the plan virtualization environment. This capital expenditure has received preliminary budgeting approval; however, where feasible and reasonable, server virtualization should be incorporated in order to maximize the efficiency of data center operations.

## Security

Users log on to the Presentation Servers based on Active Directory credentials. In addition, the PositivelyPeople application requires secondary credentials. Healthy Helping Hands explored using Citrix Single Sign-on (Password Manager) but the rollout failed because training was not provided to users.

Due to the sensitive nature of the HR application, shadowing was disabled during installation of the Presentation Servers. Going forward, however, shadowing should be enabled during installation and only allowed by Citrix policy for Level 3 support personnel

Anti-virus software is installed on each server, and it is automatically updated every hour.

HR users can access their applications externally by means of the Secure Gateway server; however, this server has had intermittent failures recently. A reliable remote access solution is a requirement for the design project.

## Systems Monitoring and Management

Healthy Helping Hands primarily uses EdgeSight Service Monitoring to monitor the Presentation Server environment. When the farm was first implemented, Resource Manager and a centralized monitoring tool were used as the primary monitoring tools but were abandoned when EdgeSight 5.0 was implemented about six months ago. Because EdgeSight Service Monitoring is included with Platinum licensing, there was no additional cost to Healthy Helping Hands.

## Disaster Recovery

Although the data center in San Francisco serves as the disaster recovery site for many of Healthy Helping Hands IT operations the Presentation Server environment is not incorporated into this site. A detailed Disaster Recovery Plan for the Citrix environment does not exist at this time. As such, the Citrix environment has not been included in any disaster recovery test. Going forward, the CIO has mandated the use of the San Francisco data center for disaster recovery.

### Question: 1

Scenario: The IT managers at Healthy Helping Hands are looking at a project to expand and upgrade their Citrix environment to meet their current and future business needs. The main business requirement for this project is to provide secure and reliable access to company-owned applications for all the current and future staff, including contractors around the world.

Which two issues present a risk to the project and its deadlines based on the assessment document?  
(Choose two.)

- A. Print jobs intermittently fail
- B. A dispersed user community
- C. Wide range of device types in use
- D. Unpredictable timing and size of acquisitions
- E. External access only through an intermittently failing Secure Gateway

**Answer: B,D**

## Question: 2

Which three sections should an architect incorporate into the Project Initiation Document (PID) to ensure that the project meets the business and technical requirements of Healthy Helping Hands?  
(Choose three.)

- A. Risk Log
- B. Stage Plan
- C. Project Scope
- D. Detailed Design
- E. Resource Requirements

**Answer: A,C,E**

## Question: 3

Given the three user types in the Healthy Helping Hands environment, task workers, mobile workers and knowledge works, which two user groups would be classified as task workers? (Choose two.)

- A. Sales
- B. Engineers
- C. Marketing
- D. Manufacturing
- E. Customer Service

**Answer: D,E**

## Question: 4

Given the three user types in the Healthy Helping Hands environment, task workers, mobile workers, and knowledge workers, which two user groups would be classified as knowledge workers? (Choose two.)

- A. Sales
- B. Marketing
- C. Engineers
- D. Manufacturing
- E. Customer Service

**Answer: B,C**

### Question: 5

Based on the assessment document, for which user group may an administrator need to use ICA session policies to control session bandwidth?

- A. Sales
- B. Finance
- C. Marketing
- D. Customer Service
- E. Human Resources

**Answer: B**

### Question: 6

Given the three user types in the Healthy Helping Hands environment, task workers, mobile workers and knowledge workers, which two user groups would be classified as mobile workers? (Choose two.)

- A. IT staff
- B. Sales staff
- C. HR employees
- D. Marketing personnel

**Answer: B,C**

### Question: 7



Scenario: As Healthy Helping Hands continues to expand, the demands placed on the current solution will increase significantly. As such, an architect must assess the current hardware to identify constraints against the company's future growth.

Which statement best describes a current hardware constraint?

- A. Hard drive capacity cannot be expanded due to space limitations.
- B. Existing server processors are not capable of supporting 64-bit architecture.
- C. The existing 1Gbps server NIC speed is insufficient for home user connectivity.
- D. Server memory is at or above the maximum supported by the current hardware and operating system.

**Answer: D**

## Question: 8

Printing security is a key requirement for the Human Resources department of Healthy Helping Hands. Which printing policy setting should be configured to enhance security for the HR department?

- A. All User Printers
- B. Session Printers only
- C. User's Default Printer only
- D. Local (Non-Network) Printers only

**Answer: B**

## Question: 9

The architect is deciding how to best deliver the Healthy Helping Hands application suite. Based on the information given in the assessment document, which application should be streamed to desktops rather than published?

- A. Finance application suite
- B. Engineer's CAD application
- C. Manufacturing ERP application suite
- D. HR PositivelyPeople application suite

**Answer: B**

## Question: 10

During the data collection and analysis phase of the project, architects discovered that certain user groups require access to several versions of Internet Explorer.

How should the architect design a deployment scenario for older versions of Internet Explorer that must be maintained indefinitely in the environment?

- A. Create one virtual machine hosted application for each Internet Explorer version and publish the applications.
- B. Create one streaming application for each Internet Explorer version and stream the applications directly to user devices.
- C. Create one application isolation environment for each Internet Explorer version and publish the applications with XenApp.
- D. Create application silos by installing different versions of Internet Explorer to different XenApp servers and publish the applications with XenApp.

**Answer: A**

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